Kentucky Academic Standards (KAS) for **Computer Science**

Progression Chart

Concept	Subconcept	Grades K-5 By the end of Grade 5, students will be able to...	Grades 6-8 By the end of Grade 8, students will be able to...	Grades 9-12 By the end of Grade 12, students will be able to...
Networks & The Internet	Network Communication & Organization	**E-NI-01:** Understand the basic components of how networks operate to protect physical and digital information.	**M-NI-01:** Model how different sets of rules (protocols) are used to transmit different types of data across networks and the Internet.	**H-NI-01:** Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, end devices, topology, and addressing.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-NI-04:** Describe the issues that impact network functionality (e.g., bandwidth, load, delay, topology). *
	Cybersecurity	**E-NI-02:** Standard 2: Model how information is broken down into smaller pieces (data packets), transmitted over various paths (physical and/or wireless), and reassembled at the destination	**M-NI-02:** Model how information is disguised using different methods of encryption to secure it during transmission from one point to another.	**H-NI-02:** Give examples to illustrate how sensitive data can be affected by viruses, malware and other attacks.
		function moveForward() { var standard }	**M-NI-03:** Explain how physical and digital security practices and measures proactively address the threat of breaches to personal and private data.	**H-NI-03:** Recommend security measures to address various scenarios based on factors such as usuability, efficiency, feasibility, and ethical impacts.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-NI-05:** Compare ways software developers protect devices and information from unauthorized access. *
Data & Analysis	Storage	**E-DA-01:** Appropriately store and modify digital files.	**M-DA-01:** Store data using multiple encoding methods.	**H-DA-01:** Evaluate the trade offs in how data elements are organized and where data is stored.*
	Collection, Visualization & Transformation	**E-DA-02:** Standard 2: Collect and visually display data using appropriate applications.	**M-DA-02:** Collect data using computational tools and transform the data to make it more useful and reliable.	**H-DA-02:** Collect data using appropriate data collection tools and techniques to support a claim or to communicate information.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-DA-03:** Understand and design database structures to optimize search and retrieval.*
		function moveForward() { var standard }	function moveForward() { var standard }	**H-DA-04:** Explain the privacy concerns related to the collection and generation of data.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-DA-05:** Use data analysis tools (e.g. formulas and other software data / statistical tools) to process and transform the data to make it more useful and reliable.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-DA-08:** Create interactive data visualizations using software tools to help others better understand real-world phenomena.

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	Inference & Models	**E-DA-03:** Standard 3: Analyzing data for trends and relationships	**M-DA-03:** Refine computational models based on the data they have generated.	**H-DA-06:** Use data analysis tools and techniques to identify patterns and analyze data represented in complex systems.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-DA-07:** Create computational models that represent the relationships among different elements of data.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-DA-09:** Evaluate the ability of models and simulations to test and support the refinement of hypotheses.*
Algorithms & Programming	Algorithms	**E-AP-01:** Create, follow, compare and refine algorithms for a task.	**M-AP-04:** Create flowcharts and/or pseudocode to address complex problems as algorithms.	**H-AP-07:** Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-AP-13:** Use and adapt classic algorithms to solve computational problems.*
		function moveForward() { var standard }	function moveForward() { var standard }	**H-AP-14:** Evaluate algorithms in terms of their efficiency, correctness, and clarity.*
		function moveForward() { var standard }	function moveForward() { var standard }	**H-AP-16:** Illustrate the flow of execution of a recursive algorithm.*
	Variables	**E-AP-02:** Standard 2: Explore and use variables in a program.	**M-AP-05:** Create clearly named variables that represent different data types and perform operations on their values.	**H-AP-03:** Use functions, data structures or objects to simplify solutions, generalizing computational problems instead of repeated use of simple variables.
	Control	**E-AP-03:** Standard 3: Routinely create programs using a variety of tools to express ideas, address a problem or create an artifact, individually and collaboratively.	**M-AP-07:** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.	**H-AP-06:** Justify the selection of specific control structures when trade offs involve implementation, readability, and program performance and explain the benefits and drawbacks of choices made.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-AP-15:** Compare and contrast fundamental data structures and their uses.*
		function moveForward() { var standard }	function moveForward() { var standard }	**H-AP-21:** Use version control systems, integrated development environments (IDEs), and collaborative tools and practices (code documentation) in a group software project.*
	Modularity	**E-AP-04:** Standard 4: Decompose precise steps needed to solve a problem.	**M-AP-02:** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.	**H-AP-05:** Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

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	E-AP-05: Use a process when creating programs or computational artifacts.	**M-AP-06:** Create procedures with parameters to organize code and make it easier to reuse.	**H-AP-18:** Analyze a large-scale computational problem and identify generalizable patterns that can be applied to a solution.*
Program Development	**E-AP-06:** Modify, remix or reuse part of an existing program to create a new program, giving attribution to others.	**M-AP-01:** Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.	**H-AP-01:** Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries.
	E-AP-07: Standard 7: Document, share and reflect when creating programs using correct terminology.	**M-AP-12:** Develop a process creating a computational artifact that leads to a minimum viable product followed by reflection, analysis, and iteration.	**H-AP-02:** Use a development process in creating a computational artifact that leads to a minimum viable product followed by reflection, analysis, and iteration.
	E-AP-08: Standard 8: Identify and correct errors in an algorithm.	**M-AP-03:** Seek and incorporate feedback from team members and users to refine a solution that meets user needs.	**H-AP-04:** Design and iteratively develop event-driven computational artifacts for practical intent, personal expression, or to address a societal issue.
	`function moveForward() { var standard }`	**M-AP-08:** Incorporate existing code, media, and libraries into original programs, and give attribution.	**H-AP-08:** Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
	`function moveForward() { var standard }`	**M-AP-09:** Systematically test and refine programs using a range of test cases.	**H-AP-09:** Evaluate and refine computational artifacts to make them more usable and accessible using systematic testing and debugging.
	`function moveForward() { var standard }`	**M-AP-10:** Document programs in order to make them easier to follow, test, and debug.	**H-AP-10:** Systematically design and develop programs for broad audiences by incorporating feedback from users.
	`function moveForward() { var standard }`	**M-AP-11:** Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries.	**H-AP-11:** Design and develop computational artifacts working in team roles using collaborative tools.*
	`function moveForward() { var standard }`	`function moveForward() { var standard }`	**H-AP-12:** Describe how artificial intelligence drives many software and physical systems.*
	`function moveForward() { var standard }`	`function moveForward() { var standard }`	**H-AP-17:** Construct solutions to problems using student-created components, such as procedures, modules and/or objects.*
	`function moveForward() { var standard }`	`function moveForward() { var standard }`	**H-AP-19:** Select and employ an appropriate component or library to facilitate programming solutions.*
	`function moveForward() { var standard }`	`function moveForward() { var standard }`	**H-AP-20:** Develop programs for multiple computing platforms.*
	`function moveForward() { var standard }`	`function moveForward() { var standard }`	**H-AP-22:** Modify an existing program to add additional functionality and discuss intended and unintended implications (e.g., introducing errors).*

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	Program Development	function moveForward() { var standard }	function moveForward() { var standard }	**H-AP-23:** Evaluate key qualities (including correctness, usability, readability, and efficiency) of a program.*
		function moveForward() { var standard }	function moveForward() { var standard }	**H-AP-24:** Compare multiple programming languages and discuss how their features make them suitable for solving different types of problems.*
Impacts of Computing	Culture	**E-IC-01:** Standard 1: Discuss how computing has impacted society.	**M-IC-01:** Discuss issues of bias and accessibility in existing technologies.	**H-IC-01:** Reduce bias and equity deficits through the design of accessible computational artifacts.
		function moveForward() { var standard }	**M-IC-02:** Compare the positive & negative effects of computing technologies on society.	**H-IC-03:** Research how computational innovations that have revolutionized aspects of our culture might have evolved from a need to solve a problem.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-IC-06:** Evaluate the impact of the digital divide (i.e. inequity of computing access, education and influence) on the development of local communities and society.
		function moveForward() { var standard }	function moveForward() { var standard }	**H-IC-07:** Demonstrate ways computational design (i.e. algorithms, abstractions and analysis) can apply to problems across disciplines.*
	Social Interactions	**E-IC-02:** Standard 2: Discover how computing devices have affected the way people communicate.	**M-IC-03:** Collaborate with others using appropriate tools at the local, national, and/or international levels.	**H-IC-02:** Evaluate and assess how computing impacts personal, ethical, social, economic, and cultural practices.
	Safety, Law & Ethics	**E-IC-03:** Standard 3: Evaluate the relevance and appropriateness of electronic information sources and digital media.	function moveForward() { var standard }	**H-IC-04:** Explain the beneficial and harmful effects that laws governing data (intellectual property, privacy etc.) can have on innovation.
		E-IC-04: Standard 4: Understand the importance of proper use of data and information in a computing society.	function moveForward() { var standard }	**H-IC-05:** Evaluate and design computational artifacts to maximize their benefit to society.*
		function moveForward() { var standard }	**M-IC-04:** Discuss the benefits and consequences of making information either public or private.	**H-IC-08:** Debate laws and regulations that impact the development and use of software and the protection of privacy.

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Computing Systems	Devices	**E-CS-01:** Select and operate appropriate software and hardware to perform a variety of tasks and recognize that users have different needs and preferences for the technology they use.	**M-CS-01:** Recommend improvements to the design of computing devices based on an analysis of how users interact with the devices.	**H-CS-01:** Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects.
	Hardware & Software	**E-CS-02:** Identify and describe the function of common physical components of computing systems (hardware) using appropriate terminology.	**M-CS-02:** Design projects that combine hardware and software components to collect and exchange data.	**H-CS-02:** Compare levels of abstraction and interactions between application software, system software and hardware layers.
		`function moveForward() { var standard }`	`function moveForward() { var standard }`	**H-CS-04:** Categorize the roles of operating system software.
		`function moveForward() { var standard }`	`function moveForward() { var standard }`	**H-CS-05:** Illustrate ways computing systems implement logic, input, and output through hardware components.*
	Troubleshooting	**E-CS-03:** Describe basic hardware and software problems using accurate terminology.	**M-CS-03:** Identify and fix problems with computing devices and their components systematically.	**H-CS-03:** Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors.